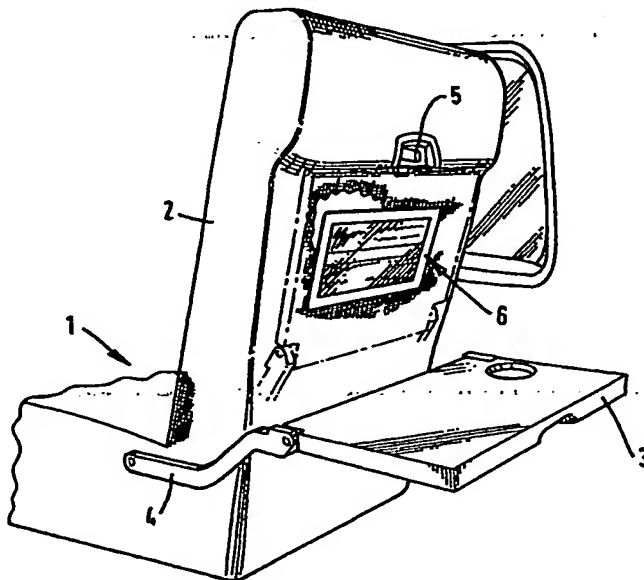


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(54) Title: ADVERTISING PANEL



## (57) Abstract

Advertising display panels for attachment to supports are described. The supports may be in passenger vehicle interiors, particularly aircraft, and embodiments are described wherein display panels are releasably fixed to seat backs. The displayed material may be printed matter, or the panel may include a screen to display still or moving graphical images or text. The panels may require a release tool for removal from the seat backs. To preserve neatness of cabin decor, the panels may be positioned so as to be concealed by tray tables attached to the seats and foldable to overlie an area of the seat back, when the tables are folded.

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ADVERTISING PANEL

The present invention relates to display panels, and is particularly concerned with panels for displaying advertisements, texts, or other graphic material. The panels find particular utility in the interior of passenger vehicles such as aircraft, trains, coaches or the like, but may be used in other locations.

US patent 5,010,668 describes an advertising device for displaying advertising material in the back of an airliner seat so that the material is visible at all times. There is also described a structure for the customary folding tray tables provided in airliners, wherein advertising material is displayed from the underside of the tray table so as to be visible when the tray table is in a stowed condition lying adjacent to the seat back.

The devices proposed in US 5010668 are thus permanently visible to the rear of the seat. Such arrangements have not found favour with vehicle operators, particularly with airlines, since an important consideration for airlines as regards their cabin decor is the initial impression which the passenger receives on entering the aircraft cabin. When considering interior decoration schemes, aircraft operators tend to favour an "uncluttered" look in order to give an impression of business-like competence to the passenger.

It is for this reason that permanently visible advertising material has not found favour amongst airline operators, since it detracts from the neatness of the cabin interior.

5        There is also known from WO 95/14588 an advertising display pocket formed from flexible film material and containing a printed insert, which display pocket is either attached to a seat or to a seat tray table by adhesive bonding so as to be visible to a passenger  
10    seated in the next seat behind. WO 95/14588 discloses adhesively attaching advertising material to the back of a seat, in a position in which the advertising material is concealed when a tray table attached to the seat is folded up, and revealed when the tray table is horizontal  
15    for use. A disadvantage of such "stick-on" types of advertising display is that they present an irresistible temptation to passengers, particularly to younger passengers on long flights, to attempt to peel off the advertising. Such attempts result in an unsightly  
20    appearance when the next passenger is seated, leading to a loss of reputation for the operator.

Aircraft operation is made economical only if the aircraft can be kept flying for the maximum proportion of its working life, and operators therefore strive to  
25    minimise the time required to "turn round" an aircraft at the end of a journey, in preparation for its next departure. In aircraft where advertising is to be

displayed, there is a need periodically to change the display materials, to cope with seasonal variations of product, or to publicise special offers for a limited time. The devices of the prior art require that each  
5 seat is visited, its display material removed from the display device or pocket, and new material inserted or stuck on to the display area. This removal and replacement of flimsy printed sheets or adhesive stickers is a time-consuming procedure and reduces efficiency of  
10 operation by delaying the aircraft "turn round".

There remains therefore the problem of providing a form of cabin interior advertising which is acceptable to vehicle operators, and to airline operators in particular, and effectively delivers the advertiser's  
15 message while preventing unauthorised removal or other tampering with the display.

The present invention seeks to provide a display panel for use inter alia on aircraft seats, which allows advertising displayed within the aircraft to be changed  
20 rapidly with the minimum prolongation of "turn round" time but prevents the display material from being removed or defaced by passengers.

The disadvantages of prior art devices are overcome according to one aspect of the present invention by  
25 providing an advertising display panel which is detachably mountable to a supporting surface such as a vehicle seat, and has a front and a rear face defining

therebetween a cavity to receive a display insert, the front face having a transparent window through which a display insert in the cavity is visible, and the rear face having an opening through which the display insert  
5 may be placed into and removed from the cavity. The opening is thus accessible only when the display panel is removed from the supporting surface, in the preferred embodiments. Preferably the detachable mounting is effected by means of cooperating mounting means on the  
10 rear face of the display panel and on the supporting surface, for example the vehicle seat or seat cover. More preferably, mounting means such as studs are permanently or semi-permanently fixed to the seat or seat cover, and are releasably cooperable with mounting  
15 structures on the rear face of the display panel. Yet more preferably, release of the cooperating mounting studs and structures is effected by a release tool or implement. In a most preferred embodiment, a release tool is applied to or through the front face of the  
20 display panel to release the cooperating mounting studs and structures.

By detachably mounting the display panels to the aircraft seats, a change of advertising may be achieved rapidly, preferably by removing the entire panel from the  
25 seat and replacing it with a fresh panel into which the new advertising material has already been loaded. The time-consuming operation of removing a printed sheet from

each display panel and replacing it with another may be effected in advance, at for example a warehouse or factory, rather than in the aircraft cabin during 'turn round'. The operation of exchanging a rigid panel on a seat takes considerably less time than exchanging the printed material, and the delay to 'turn round' is thus much reduced. The pre-loaded panels also serve to protect the advertising material in transit to the aircraft, ensuring the best possible appearance to the public. It is however possible to reduce capital costs by removing each display panel, exchanging its insert for a new one, and remounting the same panel. The need to provide a "spare" set of display panels is avoided, but the time taken to change the display is increased. Nevertheless, even this procedure will be less time-consuming than removing and replacing adhesive display materials since the adhesive used to fix such materials must be strong enough to withstand attacks by passengers and is therefore difficult to dislodge.

According to a second aspect there is provided a passenger seat having a display panel releasably mountable thereto by mounting means comprising first and second cooperating mounting elements, the first mounting element being fixed to the seat or to a seat covering material and the second mounting element being associated with the display panel.

In a preferred embodiment, the first mounting

element includes an abutment and the second mounting element includes a movable detent which engages the abutment when the panel is mounted to the seat, and is movable to a release position wherein the first and  
5 second mounting elements are separable. Most preferably, the movable detent is resiliently biased away from the release position, and may be moved toward the release position by a release tool or implement.

According to a third aspect, a passenger seat having  
10 a generally planar tray table mounted for movement between a deployed position wherein the table occupies a generally horizontal position behind the seat back and a folded position wherein the tray table lies adjacent the rear surface of the seat back, has an advertising  
15 display panel detachably fixable to the seat back and containing an exchangeable display insert visible through a display window of the panel when the tray table is in the deployed position, and concealed by the tray table when the tray table is in the folded position.

20 According to a fourth aspect, there is provided method of changing the display material displayed in a passenger vehicle provided with a first display panel on the back of a passenger seat for new display material, comprising the steps of:

25 preparing a second substitute display panel displaying the new display material;

removing the first display panel from the seat; and



mounting the substitute display panel to the seat.

Where the seat has a fabric covering, the display panel may be detachably mounted to the fabric covering material. Alternatively, the display panel may be  
5 detachably mounted to a rigid seat back panel, and if necessary a fabric covering extending over the rigid seat back panel may be formed with an opening through which the display panel is visible, and through which the display panel may pass during removal and refitting to  
10 the seat.

Embodiments of the present invention will now be described in detail with reference to the accompanying drawings, in which:

Figure 1 is a perspective view of an aircraft seat;

15 Figure 2 is an exploded perspective view of an advertising display device;

Figure 3 is a rear view of the device of Figure 2 attached to a seat back;

20 Figure 4 is a sectional view taken along the lines IV to IV of Figure 3;

Figure 5 is a view similar to Figure 3 showing an alternative method of fixing the display device to the seat;

25 Figure 6 is a view of the reverse side of the embodiment shown in Figure 5;

Figure 7 is a partial section taken along the line VII to VII of Figure 5;

Figure 8 is a partial section taken along the line VIII to VIII of Figure 6;

Figure 9 is a view similar to Figure 3 of yet another embodiment of the display device;

5        Figure 10 is a sectional view taken along the line X to X of Figure 9; and

Figure 11 is a perspective view in partial section of yet another embodiment of the display device.

10        Figure 12 is a partial exploded perspective view showing the mounting elements of a further embodiment of a display frame;

Figure 13a is a perspective view of a first mounting element to be attached to a seat back;

15        Figure 13b is a side and perspective view of an alternative assembly for a mounting element to be attached to a fabric seat cover panel.

Figure 14 is a sectional view showing the display frame of Fig. 12 mounted to the mounting element of Fig. 13a;

20        Figure 15 is an exploded perspective view from the rear of an alternative embodiment of the display panel;

Figure 16 is a sectional view of line XVI-XVI of Figure 15.

25        Figure 17 is a sectional view similar to Figure 14, of the display frame of Figure 15 mounted to the mounting element of Figure 13b;

Figures 18 and 19 are front and rear perspective

views of an alternative embodiment of the display device;

Figure 20 is a schematic representation of the functional elements of the display panel of Figures 18 and 19;

5        Figure 21 is a schematic illustration of a further embodiment of the invention; and

Figure 22 is a schematic representation of the operative components of the display panel shown in Figure 21.

10        Referring now to the Figures, Figure 1 shows an aircraft seat 1 with a back 2. A tray table 3 is attached to the seat 1 by means of support arms 4. Pivoting joints at the ends of the support arms 4 allow the tray table 3 to assume a deployed position shown in  
15        solid lines in Figure 1, wherein the tray table 3 occupies a generally horizontal position behind the seat back 2. To facilitate cabin access, the tray table 3 has a stowed position, shown in chain lines in Figure 1, where the tray table 3 lies adjacent to the rear surface  
20        of the seat back 2. The tray table 3 is securable in the retracted position by means of a clip or fastener 5. In the retracted position, the tray table 3 overlies and obscures from view an area of the rear surface of the seat back 2.

25        A display panel 6, substantially as shown in Figures 2 and 3, is releaseably fixed to the area of the seat back which is obscured by the tray table in its retracted

position. The front face of the display panel may have  
embodiments to contact the tray table surface when the  
table is folded, to prevent wear or damage the display  
panel due to friction or impact of the tray table. The  
5 embossments provide controlled areas of contact between  
the panel and table.

In Figure 2, an embodiment of the display panel 6  
is illustrated in perspective view. The display panel  
6 comprises a back plate 7 which is generally planar and  
10 rectangular in form, and has a thickened edge region 8  
extending along three sides. The fourth side is formed  
with a finger recess 9. The back plate 7 may be a  
continuous sheet of material, or it may be perforated to  
form a lattice, as illustrated at 10. The perimeter of  
15 the back plate 7 is provided with a fixing strip 11,  
which in the illustrated embodiment is a burr-type  
fastener. A transparent cover sheet 12, whose dimensions  
correspond to the dimensions of the back plate 7, is  
fixed to the back plate 7 at the thickened edge regions  
20 8. The thickening at the edge regions 8 thus provides  
a clearance between the transparent cover sheet and the  
back plate 7 at the central areas of the back plate 7,  
enabling a sheet of printed material 13 to be inserted  
between the back plate 7 and cover sheet 12. Access to  
25 this interior space is afforded via the edge of the back  
plate 7 which is not thickened. The finger recess 9  
permits easy removal of the printed sheet 13 for

replacement, when the display panel 6 is detached from the seat back 2.

The rear surface of the seat back 2 may be formed by a substantially rigid panel of, for example, plastics material. Alternatively, the seat back 2 may be covered with a woven fabric, either in the form of a fixed or removable cover.

When the rear surface of the seat back 2 is of a rigid material, then the display panel 6 can be fixed to the seat back 2 by bonding or otherwise fastening strips of burr-type fastener to the seat back to correspond to the burr-type fastener strips attached to the back plate 7 of the display panel 6. The position of the display panel on the seat back 2 is preferably such that the entire display panel is covered by the tray table 3, when the tray table 3 is in its retracted position.

If the seat back 2 is covered in a woven fabric material, then strips of burr-type fastener may be sewn to the covering fabric, for attachment of the display panel 6 to the covering fabric.

Alternatively, as shown in section in Figure 4, a woven fabric seat cover 16 may be formed with an opening to correspond to the dimensions of the display panel 6, so that the display panel 6 may be fastened to an underlying seat back panel. In the embodiments shown in Figure 4, strips of burr-type fastener 14 are attached to a rigid seat back panel 15, and an opening formed in

a fabric seat cover 16 allows the back plate 7 of the displayed panel to be fixed to the seat back panel 15. The edges of the opening in the fabric seat cover 16 are also provided with strips of burr-type fastener 17, to  
5 secure the edges of the opening to the seat back panel 15 round the display panel 6. This arrangement provides a neat appearance to the seat back, and can conceal the open side of the display panel to deter unauthorised removal of the advertising material 13.

10 An alternative embodiment of the invention is shown in Figures 5 to 8. This embodiment is intended for use with fabric seat covers which are removable from the seat for cleaning, but can also be used in seat designs wherein the rear surface of the seat back 2 is covered  
15 by a panel of fabric material separate from the remainder of the seat covering materials.

In the embodiments shown in Figures 5 to 8, the cover sheet 12 is extended upwardly and downwardly beyond the back plate 7 as seen in Figures 5 and 6. Slots 21  
20 are formed adjacent the upper and lower edges of the cover sheet 12, to form fixing bars 20 attached at their respective ends to the cover sheet 12 by bridges 22.

As can be seen in Figure 7, slots 21 are positioned outside the boundaries of the back plate 7. Extending  
25 horizontally in the central area of the back plate 7 is a strip of burr-type fastener 23, whose purpose will be described later.

Figure 6 is a view of the interior of the seat back fabric cover panel. To accommodate the display panel 6, the seat back fabric is formed with a horizontal slit corresponding in length to the lengths of the slots 21, and two vertical slits are formed at the ends of the horizontal slit. The lengths of the vertical slits correspond to the spacing between the slots 21 and the slits define generally rectangular upper and lower flaps 27 and 28. Strips of burr-type fastener 24 are attached to the exterior surface of the seat back panel fabric adjacent the horizontal edges of the flaps 27 and 28, and vertically extending strips 25 of burr-type fastener are fixed to the exterior surface of the fabric panel adjacent the vertical edges of the flaps 27 and 28.

15 To attach the display panel 6 to the seat back cover fabric, the horizontal edges of the flaps 27 and 28 of the seat back cover fabric are passed through the slots 21, so that the fabric underlies the base plate 7. Burr-type fasteners 24 are then fixed to the burr-type fastener strip 23 extending horizontally across the central region of the base plate 7. The base plate 7 is also provided with vertically extending areas of burr-type fastener 26, to which the fastener strips 25 adjacent the vertical edges of flaps 27 and 28 of the seat back cover fabric are attached.

As is clear from Figure 5, the bars 20 underlie the seat back cover fabric and the display material 13 is

visible through the cover sheet 12. The position of the slits in the seat back cover fabric is such that the display panel occupies an area of the seat back which is concealed by the tray table 3 when the tray table 3 is in its stowed position.

A further alternative embodiment of the display panel is shown in Figures 9 and 10. In this embodiment, the display panel is attached to a fabric seat cover by means of zip-type fasteners.

10 The display panel in this embodiment has the cover sheet 12 extended beyond the base plate 7 in all four directions, with slots 21 formed adjacent the edges of the cover sheet 12 along each side. Bridges at the corner regions of the cover sheet 12 serve to attach edge bars 20 to the remainder of the cover sheet.

15 Along each edge of the display panel 6, one half of a separable zip fastener is attached to the edge bar 20. In the embodiments shown in Figures 9 and 10, a cover strip 31 is passed round each edge strip 20, and half of a zip fastener 32a is attached to the cover strip 31 by sewing, so that the cover strip 31 extends over the zip fastener and attaches the zip fastener to the edge bar 20.

25 A corresponding reinforcing strip 33 is attached to the seat back cover fabric 30, and a second cover strip 34 and a complimentary zip fastener component 32b are attached to the seat back cover fabric 30 and the



reinforcing strip 33.

As is clear from Figure 10, when the two halves 32a and 32b of the zip fastener are fastened together, the cover strips 31 and 34 substantially conceal the zip  
5 fastener from view.

As can be seen from Figure 9, the zip fasteners are so arranged that when the four zip fasteners are closed, the sliders 35 of the zip fasteners are grouped together in pairs. In this position, the sliders may be fixed  
10 together so that opening of the zips is deterred. Preferably, light weight snap-fasteners may be used to fix the sliders together. The fasteners may be broken to free the sliders 35 to enable advertising material to be replaced in the display panel.

15 The cover sheet 12 and back plate 7 are preferably formed from light weight material such as plastics. The components of the display panel may be fixed together by any suitable fixing means, such as by adhesive bonding, by ultrasonic welding, by snap-engagement, or by any  
20 other suitable fastening means.

In Figure 11 an alternative structure for the display panel is shown, wherein the back plate 7 has raised edge regions of substantially constant thickness. By displacing the edge regions forward of the central  
25 part of the back plate 7, rebates 40 are created in the rear face of the back plate 7. The rebates 40 may accommodate burr-type fasteners for fixing the display

panel to the seat back. The back plate 7 shown in Figure 11 may be formed for example from pressed aluminium sheeting.

In an alternative embodiment of the display device, not illustrated, dispensing means for leaflets etc may be incorporated in the display device so that promotional material may be distributed from the display panel, either in addition to or instead of a static advertising display.

Although the display panels described herein are rectangular in shape, it is to be understood that circular, elliptical, polygonal or any other suitable shapes may be used, provided that the display panel may be concealed by the tray table when retracted.

Although burr-type and zip fasteners are described in relation to the above embodiments, any other suitable releasable fastening means may be used to fix the display panel to the seat back or the seat cover fabric such as buttons or press studs. Referring now to the Figures 12, 13a and 14 Figure 12 shows an alternative embodiment of the display panel 6 seen in Figure 1, illustrated in partial exploded perspective view. The display panel comprises a substantially rigid back plate 107 which is generally planar and rectangular in form, and has a pair of peripheral ribs 108 and 109 defining a channel 10 therebetween. The back plate 107 may be a continuous sheet of material such as rigid plastics or light metal,

or it may be perforated to form a lattice at its central region, to reduce weight. A transparent cover sheet 112 (seen in Figure 14), whose dimensions correspond to the dimensions of the area of the back plate 107 within the inner rib 109, is held to the back plate 107 by the thickened edge regions 111a of a covering frame 111. The dimensions of an internal flange 111a provide a clearance between the transparent cover sheet 112 and the back plate 107 at the central areas of the back plate 107, enabling a sheet of printed material 113 to be inserted between the back plate 107 and cover sheet 112. Access to this interior space for exchanging the printed material 113 may be afforded via an opening in the back plate 107, or may be achieved by removing the covering frame 111 and transparent sheet 112.

At a predetermined number of locations round the periphery of the back plate 107, within the channel 110, the back plate 107 is formed with openings 115. A resilient spring 116 in the form of a "U" has its parallel legs 116a 116b extending across chords of the circular opening 115. The free ends of the legs 116a 116b are splayed to approach the facing sides of the ribs 108 and 109 respectively. The curved portion 116c of the spring is held captive between two pillars 117, 118 formed on the back plate 107.

The covering frame 111, of the same shape as the periphery of the back plate 107, is a generally inverted

channel section having a web 111w, an internal flange 111a and an external flange 111b. The covering frame 111 is dimensioned to fit over the ribs 108 and 109 defining the channel 110, with the internal flange 111a lying adjacent the rib 109 and the external flange 111b lying adjacent the rib 108. A detent 111d on the external flange 111b snap-engages the underside of the baseplate 107 to retain the covering frame 111 in place.

The web 111w of the covering frame 111 is formed with openings 111t, through which a release tool 130 may be inserted. Each opening 111t is so positioned that the tool 130, when introduced through the opening 111t, engages the legs 116a, 116b of a spring by means of cam surfaces 130a, 130b, respectively, and causes the legs 116a, 116b to be spread apart, for reasons to be described later.

Figure 13a shows a mounting element 150 for attachment to a seat back. The display panel is releasably mounted on a number of these mounting elements or studs 150, which are fixed either to the seat back, or to a covering fabric.

When the rear surface of the seat is covered by a fabric, the studs 150 shown in Figure 13a are fixed to the fabric at appropriate locations by inserting the pointed tip 151a of piercing shank 151 through the fabric until a flange 152 bears against the outside surface of the fabric. The piercing shank 151 is then staked using

heat or an ultrasonic head to form the material of the piercing shank 151 into a flange 151b (shown in Figure 4) which underlies the fabric, clamping the fabric between this newly-formed flange and the flange 52.

5 Alternatively, a backing component 160 as seen in Figure 13b may be placed behind the fabric, and the piercing shank 151 may be engaged and retained by the backing component 160 to fix the stud 150 at its location on the fabric. Snap engagement is contemplated, or a threaded  
10 engagement between the shank 151 and the backing component 160 is foreseen, but any suitable fixing may be used. The backing component 160 of Figure 13b has resilient fingers 161 which deform as the shank 151 passes between them, preventing withdrawal of the shank  
15 from the backing component 160. Preferably the shank 151 is of a sufficiently small diameter that the stud 150 can be removed from the fabric without leaving a permanent mark. Multiple shanks on each stud, and optionally multiple backing components, are foreseen, in order to  
20 provide the required strength while reducing the diameter of each shank 151.

Extending coaxially from the flange 152 is a stud 153 with an enlarged head 154, the head having a frustoconical shape. An undersurface 154a of the head  
25 faces toward flange 152, and a conical upper surface 154b of the head 154 acts as a cam surface, as will be described later.

When the rear surface of the seat back is of a rigid material, then the display panel can be fixed to the seat back by bonding or otherwise fastening to the seat back a number of mounting studs similar to those shown in  
5 Figures 13a and 13b, but from which the piercing shanks 151 has been removed. These studs may be attached by adhesive pads attached to the seat back and to the underside of flange 152, or an adhesive material may bond the flange 152 directly to the seat back. Preferably an  
10 adhesive such as a hot-melt adhesive is used which allows the stud to be removed without marking the seat back by reheating the adhesive.

In an alternative embodiment, a seat having a woven fabric seat cover may have its cover formed with an  
15 opening to correspond to the dimensions of the display panel, so that the display panel may be fastened to an underlying seat back panel.

To attach the display panel to the seat, a number of mounting studs 150 are attached to the seat or seat  
20 cover in an array which corresponds in number and position with the openings 115 in the back plate 107 of the display panel. The panel is mounted to the seat by offering the panel up so that the heads 154 of the studs 50 enter respective ones of the openings 115. By  
25 pressing the panel firmly, the conical surfaces 154b of the heads 154 act as cams to urge the legs 116a 116b of the springs 116 apart. When each head 154 has passed

between the legs 116a, 116b of its respective spring 116, the legs move resiliently inwardly to underlie the abutment surface 154a of the head, preventing withdrawal of the head and holding the display panel firmly on the  
5 seat.

To remove the display panel, release tool 130 is inserted in release slot 111w to splay the legs 116a and 116b, allowing the head 154 to pass out through the opening 115.

10 In display panels having a plurality of mounting studs and springs, a single release tool 130 will not completely release the panel in one operation. A plurality of release tools 130 mounted in an array may be simultaneously introduced into a plurality of release  
15 openings 111t in the covering frame 111, permitting rapid removal of the display panel.

To exchange the advertising material within the display panel, an opening or slot is formed in the base plate 107 within the area bounded by rib 109. The  
20 advertising material 113 may then be removed only when the panel is dismounted from the seat, preventing unauthorised tampering.

Figures 15, 16 and 17 show views of a further embodiment of the display panel. Figure 15 shows the  
25 rear face of the panel, with one end seen in exploded view. In this embodiment, the display panel 200 comprises a pair of side members 201 which are tubular

extruded plastics or aluminium sections. The side members 201 are joined by a pair of end caps 202, each of which has fixing portions 203 which extend into respective ends of the side members 201. The fixing portions 203 have embodiments 204 which cooperate with openings 205 in the side members 201 to prevent removal of the end caps 202 from the side members 201.

The fixing portions 203 each carry a 'U' shaped spring 206 in a recess in their rear surface. The legs of the springs extend across chords of respective openings 207 in the fixing portions 203. When the fixing portions 203 are inserted into the respective ends of side member 201, the openings 207 and 208 are aligned.

A respective release tool slot 209 is formed in the end cap 202, adjacent the free ends of the legs of each spring 206.

Each side member 201 has upper and lower flanges 210, 211 on its side facing the other side member 201. A transparent window 212 extends between the side members, abutting the upper flanges 210. The window 212 may be fixed to the end caps 202, such as by welding or bonding. An advertising insert 213 underlies the window 212, to be visible therethrough. Supporting the advertising insert 213 is a stiffening plate 214, in this embodiment formed from a cellular plastics material having two skins joined by a number of parallel ribs. The ribs preferably extend across the frame from one side



member 201 to the other. The window 212, insert 213, and stiffener 213 are held between the upper and lower flanges 210, 211 of the side members 201.

The display panel is mounted to a support such as  
5 a vehicle seat using mounting elements or studs, in the same way as has been described in relation to the embodiments of Figures 12 to 14, and is released by inserting a release tool through the slots 209.

In an alternative embodiment, not illustrated, the  
10 mounting stud may be a resiliently deformable detent and may cooperate with a fixed abutment provided in the display frame. In yet a further alternative, a key-operated latching means may retain the mounting elements in their engaged configuration, operation of a key  
15 allowing them to be released.

The materials used in the construction of the display panels should be suitable to meet any fire resistance or other requirements made in relation to the materials of the seat back. Fire resistant polycarbonate  
20 and aluminium are preferred materials for the display panel and the studs.

In Figure 18, there is seen another embodiment of a display panel 300 which is releasably attachable to a support such as an aircraft seat back by means of  
25 mounting studs 301 fixed to the seat and cooperable with springs 303 extending across openings 304 in the rear face of the display panel, as has been described hereinabove.

The front face of the display panel 300 comprises a screen 340 which can display graphics and text, a optionally a loudspeaker 341 and a plurality of user buttons 342, and a number of release tool slots 343 whose  
5 purpose has already been disclosed.

The upper, lower and side edges of the display panel may be provided with photoelectric panels 345 ("solar panels") to provide power to the display panel, and a further photosensitive element 344 may be provided, for  
10 example on the front face of the panel 300, for switching purposes to be described.

The rear face of the panel 300 may have a "power on/off" switch 346 mounted thereon, and a battery access cover may be provided on the rear face. The solar panels  
15 345 may provide power directly to the display panel, or may be arranged to charge batteries which power the display panel.

The operational components of the display panel 300 are shown schematically in Figure 20. These include a  
20 processor 441 including memory for storing control programs, working RAM memory, a display controller 442 for driving the screen 340, and a memory unit 443 for storing text and/or image data for display.

The memory unit 443 may be a conventional floppy  
25 disc drive, or may be a removable ROM circuit chip or other physically exchangeable memory device 444. Display data is stored in the memory unit on the exchangeable

device, and processor 442 retrieves display data from the device 444 and sends it to the screen 340 via display driver 442. Access to the removable memory device 444 is preferably provided via the rear face of the display panel, so as to be accessible only when the panel is removed from its supporting surface.

As an alternative to a physically removable memory device 444, the memory 443 may have a fixed erasable storage device, and an input device 445 such as a communication port 443a may be provided preferably on the rear face of the panel, connected to the processor 441 so that data in the memory unit 443 may be updated or replaced. The processor 441 may be operative to execute a display routine whenever power is supplied to the device, or, in response to the presence of data in the memory unit 443, or the presence of a removable memory device 444 in the memory unit 443.

Alternatively, the processor 441 may include timing means to display the data at discrete intervals, alternating with periods of rest. The data may be moving text and graphics, and a viewer may interact with the display panel by operating input devices such as a touch screen or user buttons 342 to alter the screen display, to mute sound, or to answer questions posed by the displayed material. Answers may be recorded in a memory in the display panel, and may be retrieved via an output port (not shown).

The processor may be operable in active and sleep modes, the sleep mode being invoked when for example the display device is concealed by a folded airline tray table. Photosensitive element 344 will sense the presence of the folded table, and may be linked to the processor to change the mode of operation from active to sleep when the tray table is folded up.

To exchange the display material, the memory unit 444 may require replacement, this may be done by preparing a set of panels 300 pre-loaded with memory units having the 'new' data, and exchanging each panel having the 'old' data for a replacement panel, in a manner analogous to that described for the printed insert panels. The electronic display panel may be configured so as to be mountable to the same array of mounting studs as is the printed material display panel of Figures 12 to 17. A vehicle can be provided with a mix of printed and electronic display panels, situated to maximise exposure while minimising the cost of the electronic panels by reducing their number.

The replacement electronic panels may be prepared, tested for correct operation, and stored with their circuitry deactivated by setting the power on/off switch 346 to "off". The power switch 346 is set to 'on' immediately before the panel is mounted for use. Alternatively, each panel may have a sensor such as an attitude switch or detector to sense the cooperation of

the mounting elements, in order to switch the power on whenever the panel is mounted to a seat. The panels may be stored in a horizontal position, and switched on by a tilt switch when placed vertical for mounting to a seat  
5 back.

In an alternative embodiment, each panel 300 may be provided with an infrared or radio receiver, so that the contents of the memory of each panel may be updated by broadcasting an updating signal. Such a signal may be  
10 sent to all or to selected panels, so that different panels may display different data.

Although the display panels described herein are rectangular in shape, it is to be understood that circular, elliptical, polygonal or any other suitable  
15 shapes may be used.

A further alternative installation is illustrated in Figures 21 and 22, and provides a plurality of display terminals 518 controlled by a central control station. The control station includes a processor 510, an input  
20 device 511 for inputting data, a memory 512 for storing data, a monitor 513 linked to processor 510, and ROM and RAM memories 514 and 515. Control programs for operating the installation may be stored in ROM 514.

The control station includes an output interface 516  
25 connected to a distribution network 517, to which a plurality of display terminals 518 are connected. The display terminals each have a screen 519, which in the

embodiment of Figure 21 is seen mounted in an aircraft seat 501 with a back 502. A tray table 503 is attached to each seat Q1 by means of support arms 504. The tray table 503 can assume a deployed position as shown in  
5 Figure 21, occupying a generally horizontal position behind the seat back 502. The tray table 503 has a retracted or stowed position wherein it overlies and obscures from view an area of the rear surface of the seat back 2.

10 The display terminal 518 is fixed to the seat back 502 with the screen 519 in the area of the seat back 502 which is obscured by the tray table 503 in its retracted position.

A display panel 18 is shown in detail in Figure 22,  
15 and includes a display screen 519, linked to a processor 531 by a display driver 53. The processor 531 is linked to the network 517 via an interface 533, and is provided with ROM and RAM for storing control programs and working data respectively.

20 The control station stores in its memory 512 the images or other advertising material to be displayed on the display terminals 518. This display data is input via the input device 511, which may be a keyboard, scanner, removable disc drive, or any other device for  
25 providing an input signal to the processor 510. Processor 510 stores the display data in memory 512.

Monitors 513 at the control station enables an

operator to inspect display data.

Processor 510 is controlled by programs stored in ROM 514 to retrieve display data from memory 512 and send it via the interface 516 to the distribution network 517.

5 Such data may be in the form of still or moving images, text, or combinations thereof. The distribution network 517 distributes the signal from the interface 516 to each of the display terminals 518, so that the image or text data is displayed on the screens 519. It is envisaged  
10 that all or some seats in a vehicle (such as an aircraft) may be equipped with screens to provide for the display of data, the screens releasably mounted to the seats using the same mounting elements as are used for the printed material displays described above.

15 Each of the display terminals 518 preferably comprises an interface 533 connected to the network 517, which receives signals from the network. Under control of a processor 531, data is received and stored in a memory 534. The memory preferably accommodates a number  
20 of data items. The processor 531 which controls the functioning of the terminal, retrieves data from memory 534 for display on the display on the screen display 519 via a display driver 532.

As an alternative to displaying the same data on all  
25 screens, it is foreseen that different data may be displayed on different groups of screens or individual screens. In such an embodiment, each display terminal

518 may be assigned an address, and the display data sent by the control station may be associated with address information specific to a particular display terminal or group of terminals, and may be sent to that or those  
5 terminals for storage in a memory at the terminal. Each terminal's processor 531 will interrogate data on the network and compare its address information with the address of the terminal, so as to receive and store only data intended for that terminal. The processor 531 will  
10 then control the display driver to display the data on the screen 519 of that terminal.

The control station may determine when each of the terminals starts and stops the display of data by sending either individual or collective start and stop commands  
15 via the network. The start and stop commands may have associated with them the address of an individual terminal or a group of terminals, or may be addressed to all terminals. On receipt of a start command, each terminal commences display of the data in its memory, and  
20 may repeat the display until a stop command is issued. Alternatively, the terminal may display the data until a predetermined time has elapsed.

The control station may include a timer and circuitry to send out start and stop signals to one or  
25 more terminals at preselected or random intervals, so that the displays become active and inactive intermittently to stimulate interest.



The control station preferably also includes means to select data items stored in its memory for sending to one or more terminals, and can address command signals to the terminals so that each terminal can execute a display routine.

A display routine may be the display of all data items in the memory 534 of the terminal in a predetermined order, the display of data items in a random order, the intermittent display of one or a series of data items interspersed with intervals of no display, or any other sequence. Programming of the terminals is effected from the control station, using operator inputs via the input device 511.

While the display panel is primarily intended for use in airline environments, seats equipped with display panels according to the invention may be used in any passenger vehicle to provide a neat and attractive initial impression to the passenger while simultaneously enabling advertising material to be displayed to the passenger during his or her journey.

The structure disclosed for fixing the display panel to a supporting surface may be adapted to provide a concealed fixing for other purposes, for example for mounting a framed picture or a notice or sign to a wall. Such a fixing may find utility in public places such as restaurants, where the picture may be securely mounted by concealed fixings, but the frame may be removed from

the wall easily for the picture to be changed to match the decor after redecoration, or if the wording of a sign or notice requires alteration.

In such applications, the mounting elements may be  
5 configured with the piercing shank 151 replaced by a threaded shank for cooperation with a conventional wall plug. Alternatively an adhesive may be used to bond the mounting element to a wall. In further alternative  
10 embodiments the mounting element may be an integrally moulded plastics component including an expanding dowel type fixing, or a conventional headed fixing screw may be used with a screw thread.

Claims

1. A passenger vehicle seat having a seat back with a front and a rear surface and a display panel mounted to  
5 the rear surface of the seat back, wherein the display panel is releaseably fixed to the seat back by first and second cooperable mounting elements, one of the first and second cooperable mounting elements being provided on the rear surface of the seat back, and the other of the first  
10 and second cooperable mounting elements being provided on the display panel.

2. A seat according to claim 1, wherein the first mounting element includes an abutment and the second  
15 fastening element has a detent, the detent being movable from an engagement position, in which the detent engages the abutment to hold the first and second mounting elements together, to a release position in which the detent is clear of the abutment and the first and second  
20 mounting elements are separable.

3. A seat according to claim 2 wherein the first mounting element is provided on the rear surface of the seat back and the second mounting element is provided on  
25 the display panel.

4. A seat according to claim 2 wherein the first

mounting element is provided on the display panel and the second mounting element is provided on the rear surface of the seat back.

5 5. A passenger vehicle seat according to any preceding claim, wherein the attachment between the display panel and the seat back is releasable by a releasing tool.

10 6. A seat according to any of claims 2 to 4, wherein the detent is urged toward its engagement position by a biasing means, and is movable to its release position by a releasing tool.

15 7. A seat according to any preceding claim, wherein the releasable fixing is effected by a number of cooperable mounting elements.

20 8. A passenger vehicle seat according to any preceding claim having a tray table mounted to the seat for movement between a deployed position wherein the table occupies a generally horizontal position behind the seat back, and a folded position wherein the tray table lies adjacent the rear surface of the seat back, the display panel being releasably mountable on the seat back so as  
25 to be exposed when the tray table is in the deployed position, and concealed by the tray table when the tray table is in the folded position.

9. A seat according to any preceding claim, wherein the rear surface of the seat back is covered by a flexible fabric material, and an opening is formed in the fabric material to correspond in position and size with the display panel.

10. A seat according to any of claims 1 to 8, wherein the rear surface of the seat back is covered by a panel of fabric material, and the mounting element or elements provided on the seat back are fixed to the panel of fabric material.

11. A seat according to claim 1, wherein the display panel is removably attachable to the fabric material by means of separable burr-type or zip-type fasteners.

12. A seat according to any preceding claim, wherein the display panel comprises a substantially rigid baseplate and a transparent cover sheet defining a cavity therebetween into which display material may be inserted for viewing through the cover sheet.

13. A seat according to claim 12, wherein the cavity is provided with an insertion opening for inserting display material into the cavity and removing it therefrom, the insertion opening being accessible only when the display panel is removed from the seat.

14. A seat according to claim 13, wherein the display material is a printed sheet and the insertion opening is an elongated slot.

5 15. A seat according to any of claims 1 to 11, wherein the display panel comprises an electronic display device.

16. A seat according to claim 15, wherein the display device is a cathode ray tube.

10

17. A seat cover for a vehicle seat, the seat cover having a back panel for covering the rear surface of the seat back, and a display panel being releasably attachable to the back panel so as to be visible when the  
15 seat cover is fitted to a seat.

20

18. A seat cover according to claim 17 for a seat to which a tray table is mounted for movement between a displayed position wherein the table occupies a generally  
20 horizontal position behind the seat back and a folded position wherein the tray table lies adjacent the rear surface of the seat back, wherein the display panel is releasably attachable to the back panel in such a position that when the seat cover is fitted to the seat  
25 and the display panel attached, the display panel is concealed by the tray table when in its folded position.

19. A seat cover according to claim 17 or claim 18, wherein the back panel of the seat cover is separate from the remainder of the seat cover material.

5 20. A back panel for a seat cover according to claim 19.

21. A seat cover for a passenger vehicle seat according to any of claims 1 to 10, wherein the seat cover comprises a back panel to which is attached one of the  
10 first or second cooperable mounting elements for mounting a display panel thereto.

22. A display panel for releasably mounting to a support surface by means of first and second cooperable mounting  
15 elements on the support surface and on the display panel respectively, the display panel having a front face adapted for the display of display material and a rear face whereon is provided the cooperable mounting element.

20 23. A display panel according to claim 23, wherein disengagement of the first and second cooperable mounting elements is effected by a release tool, and wherein an exposed face of the display panel includes an opening for insertion of the release tool.

25

24. A display panel according to claim 23, wherein one of the cooperable mounting elements comprises a detent

and the other of the cooperable mounting elements comprises an abutment, the detent having an engaging position wherein the detent contacts the abutment to prevent separation of the mounting elements and a release  
5 position wherein the mounting elements and a release position wherein the mounting elements are separable, and the detent is movable from the engagement position to the release position by means of the release tool.

10 25. A display panel according to claim 24, wherein the detent is resiliently biased toward the engagement position.

26. A display panel according to claim 24 or 25 as  
15 dependant on claim 23, wherein insertion of the release tool into the opening causes the detent to move to the release position.

27. A display panel according to any of claims 24 to 26,  
20 wherein the detent is mounted in the display panel and the abutment is mounted to the support.

28. A display panel according to claim 27, wherein the detent comprises a resilient element having a pair of  
25 spring legs joined at one of their respective ends, the spring legs being substantially parallel in the engagement position and urged apart in the release



position.

29. A display panel according to any of claims 22 to 28,  
wherein the display panel comprises a cavity to receive  
5 display material, a window in the front face of the  
display through which display material in the cavity may  
be viewed, and an insertion opening the display panel  
through which display material may be inserted into and  
removed from the cavity.

10

30. A display panel according to claim 29. wherein the  
insertion opening is an elongate slot.

31. A display panel according to claim or claim 30  
15 wherein the insertion opening is accessible only when  
the display panel is not mounted to a support.

32. A display panel according to any of claims 29 to 31,  
wherein the insertion opening is formed in the rear face  
20 of the display panel.

33. A display panel according to claim 29, wherein the  
display panel comprises a pair of parallel side members  
having upper and lower flanges on their adjacent sides  
25 to define a pair of channel sections facing each other,  
and a transparent window and a backing sheet having  
respective parallel edges received in the channel

sections, the cavity being defined between the channel sections, the window and the backing sheet.

34. A display panel according to claim 33, wherein the  
5 side members are joined at their respective ends by end caps, and resilient detents are enclosed by hollow end portions of the side members.

35. A display panel according to any of claims 22 to 28,  
10 wherein the front face of the display panel comprises a display screen, memory means capable of storing data to be displayed on the screen, and a processor for retrieving data from the memory means and displaying it on the screen.

15 36. A display panel according to claim 35, wherein the memory means is removable from the display panel.

37. A display panel according to claim 35, wherein the  
20 data stored in the memory means can be overwritten by new data input to the display panel by means of an input device.

38. A display panel according to claim 37, wherein the  
25 input device is an input port.

39. A display panel according to claim 37 wherein the

41

input device is an infrared or radio receiving port.

40. A display panel according to any of claims 35 to 39 wherein user input means are provided to enable a user  
5 to vary or interact with the display of data.

41. A display panel according to any of claims 35 to 40, further including a power source to provide power for the display and associated circuitry, and a power switch to  
10 selectively connect or disconnect the power to or from the display and associated circuitry.

42. A display panel according to claim 41, wherein the power switch is manually operable, and is accessible only  
15 when the display panel is not mounted to a support.

43. A display panel according to claim 41, wherein the power switch is operated by a sensor mounted in the display panel.

20

44. A display panel according to claim 43, wherein the power switch is operated by a sensor which detects the orientation of the display panel.

25 45. A display panel according to claim 43, wherein the power switch is operated by a sensor which detects the engagement of the first and second mounting elements.

42

46. A display panel according to claim 43, wherein the power switch is operated by a sensor which detects light falling on the face of the display panel on which the screen is exposed.

5

47. A display panel according to any of claims 41 to 46, wherein the power source includes a battery.

48. A display panel according to claim 47, wherein the  
10 battery is replaceable and is removed via a battery compartment cover which is inaccessible when the display panel is mounted to a support.

49. A display panel according to claim 47 wherein the  
15 battery is rechargeable.

50. A display panel according to any of claims 41 to 47, wherein the power source includes a photovoltaic cell.

20 51. A display panel according to any of claims 35 to 50, wherein the processor is capable of operating in an active mode, wherein data is retrieved and displayed, and an inactive mode wherein data is not retrieved and displayed.

25

52. A display panel according to claim 51, further including timing means on the basis of which the

processor may switch from active to inactive mode and vice versa.

53. A display panel according to claim 51, wherein the  
5 processor may switch between active and inactive modes on the basis of an output signal from a sensor.

54. A display panel according to claim 53, wherein the sensor is a light sensor.

10

55. A method of changing the display material displayed in a passenger vehicle provided with a display panel according to any of claims 22 to 34 mounted on the back of a passenger seat for new display material, comprising  
15 the steps of:

preparing a substitute display panel to display the new display material;

removing the display panel from the seat; and

mounting the substitute display panel to the seat

20 so as to display the new display material.

56. A method according to claim 55, wherein a plurality of seats of a vehicle are provided with respective display panels, and wherein the display material of a  
25 number of said plurality of display panels is to be changed comprising the steps of:

preparing a number of substitute display panels to

display the new display material;

removing each of the said number of display panels  
from their respective seats; and

mounting a substitute display panel to each of said  
5 respective seats.

57. A method of changing the display material displayed  
in a passenger vehicle provided with a display panel  
according to any of claims 22 to 34 mounted on the back  
10 of a passenger seat for new display material, comprising  
the steps of:

removing the display panel from the seat;

replacing the display material in the panel with new  
display material; and

15 remounting the display panel to the seat.

58. A method of changing the display data displayed in  
a passenger vehicle provided with a number of display  
panels according to claim 36 for new display data,  
20 comprising the steps of:

preparing substitute display panels having memories  
containing the new display data;

removing the display panels from their supports  
within the vehicle; and

25 mounting the substitute display panels to the  
supports so as to display the new data.

59. A method according to any of claims 55 to 58 wherein the passenger vehicle is an aircraft.

60. A display system for displaying information to passengers in a vehicle, comprising main storage means to store display data, processor means to retrieve data from the memory and send data to an electronic display screen, characterised in that the display screen is provided on the back of a vehicle seat having a tray table mounted thereto, the tray table having a deployed position wherein the table occupies a generally horizontal position behind the seat back, and a folded position wherein the tray table lies adjacent the rear surface of the seat back, the display screen being provided on the seat back so as to be exposed when the tray table is in the deployed position, and concealed when the tray table is in the folded position.

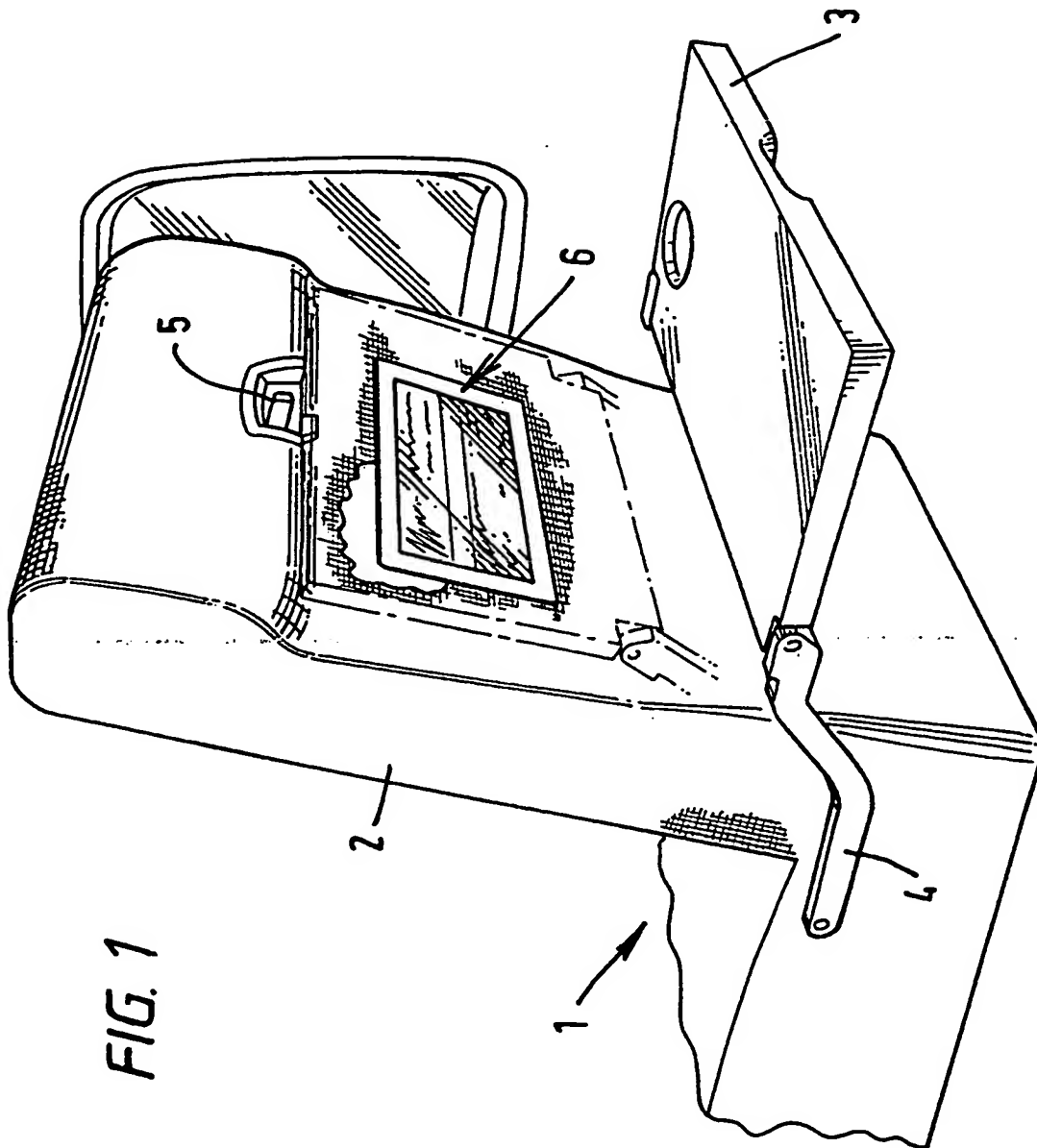
61. A display system according to claim 60, wherein a plurality of display screens are connected to a single processor and memory for simultaneous display of data.

62. A display system according to claim 60, wherein the processor and main storage means are connected to a network, and a plurality of display terminals are connected to the network, each terminal comprising a slave processor, terminal memory and a display screen,

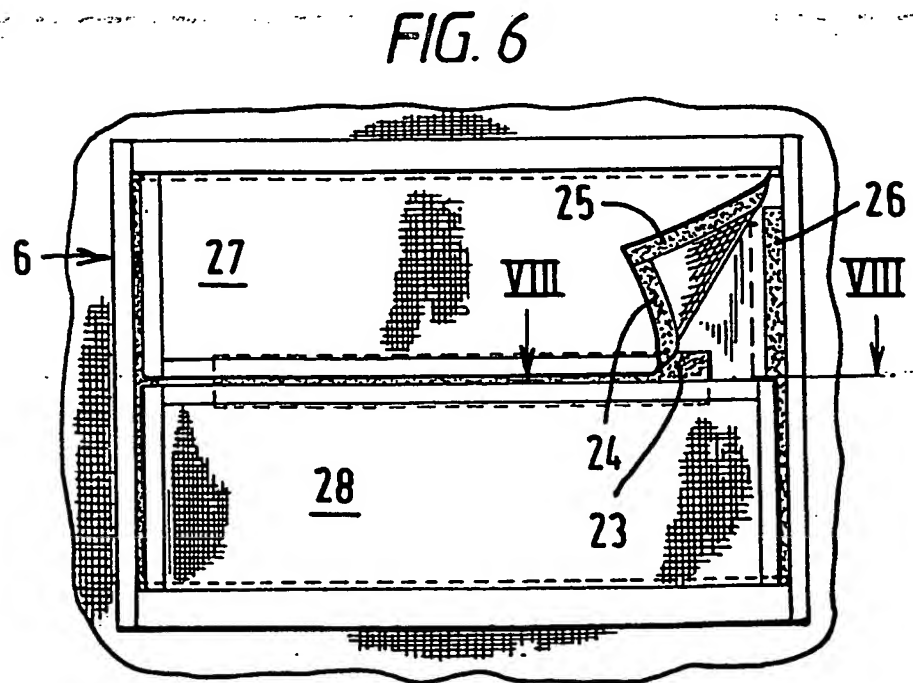
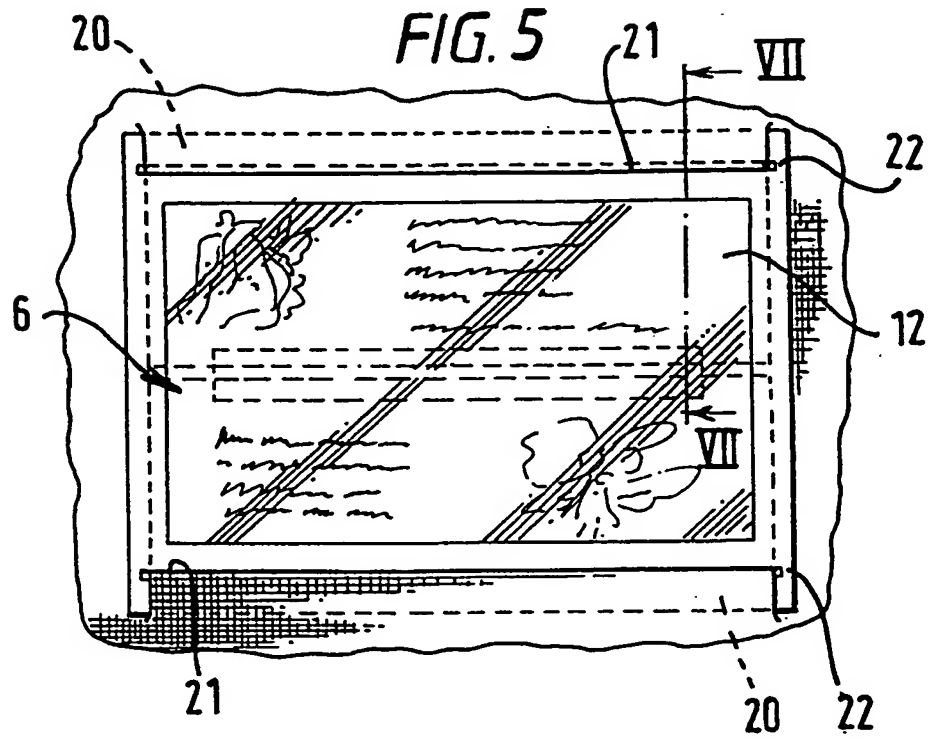
and the system including control means to retrieve data from the main storage means and transfer it to one or more of the terminal memories, and further including control means to cause data in a terminal memory to be  
5 displayed on the display screen of the terminal.

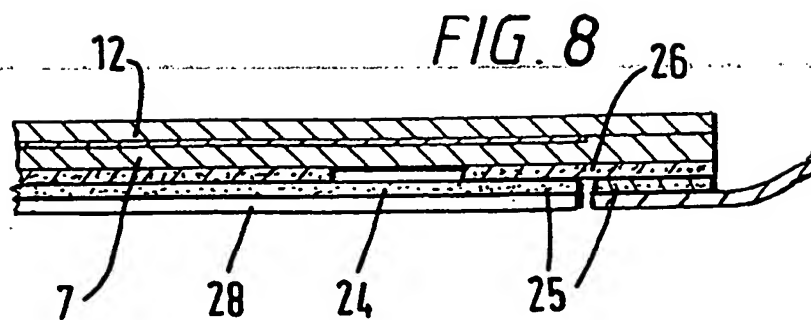
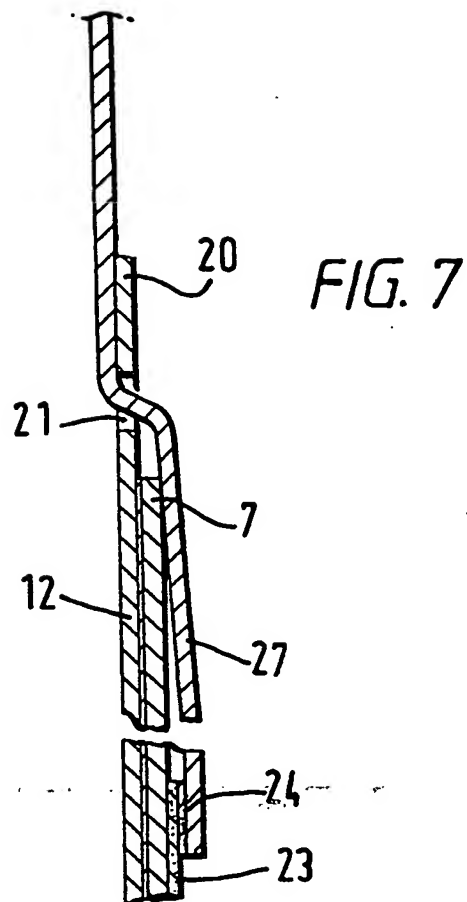
63. A display system according to claim 62, wherein each display terminal has an associated address, and control means are provided to attach address information to  
10 display data sent via the network so that only terminals with corresponding address information will receive the display data.











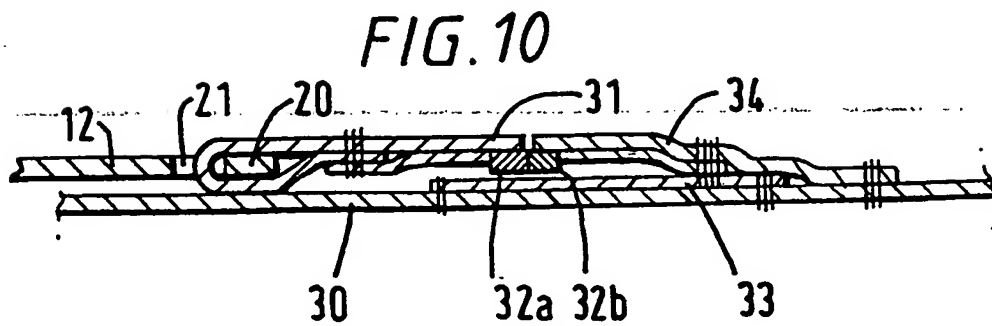
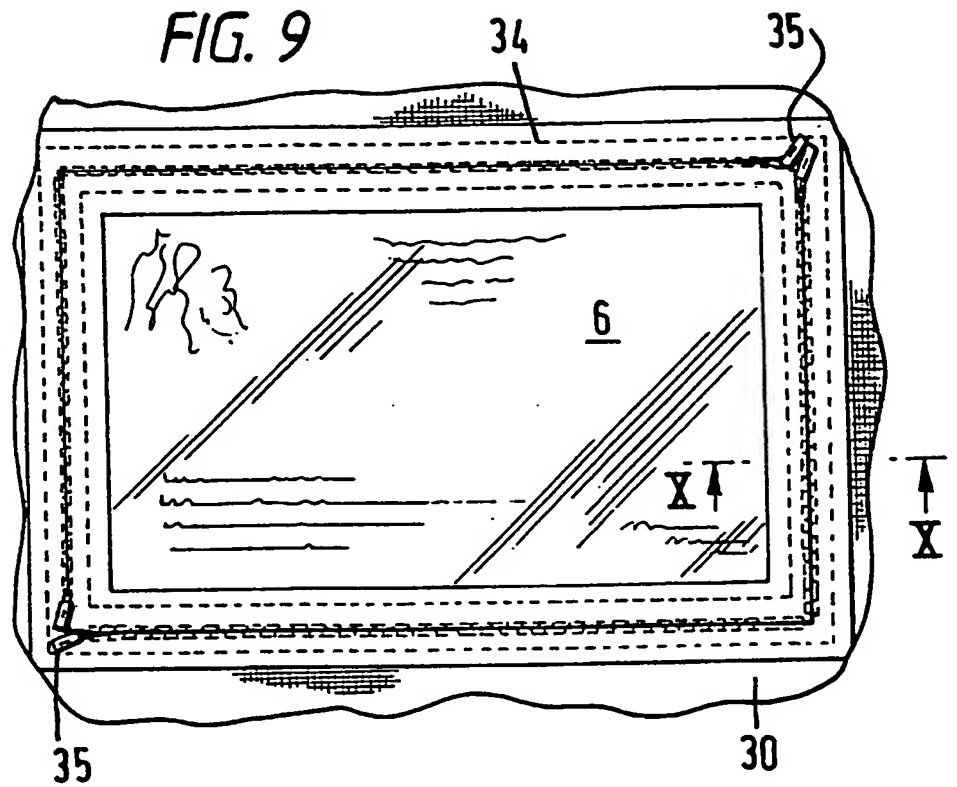
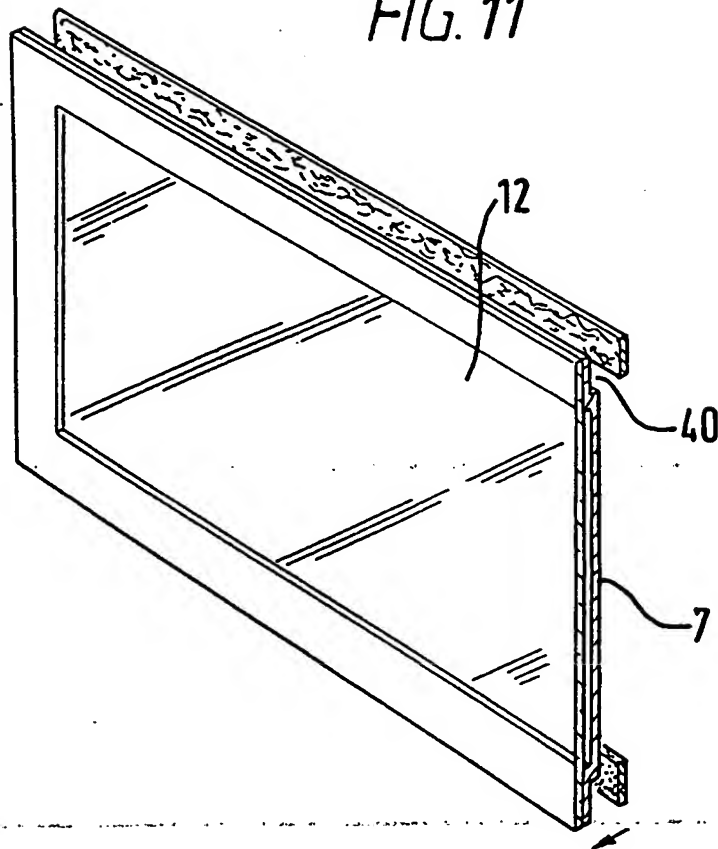


FIG. 11



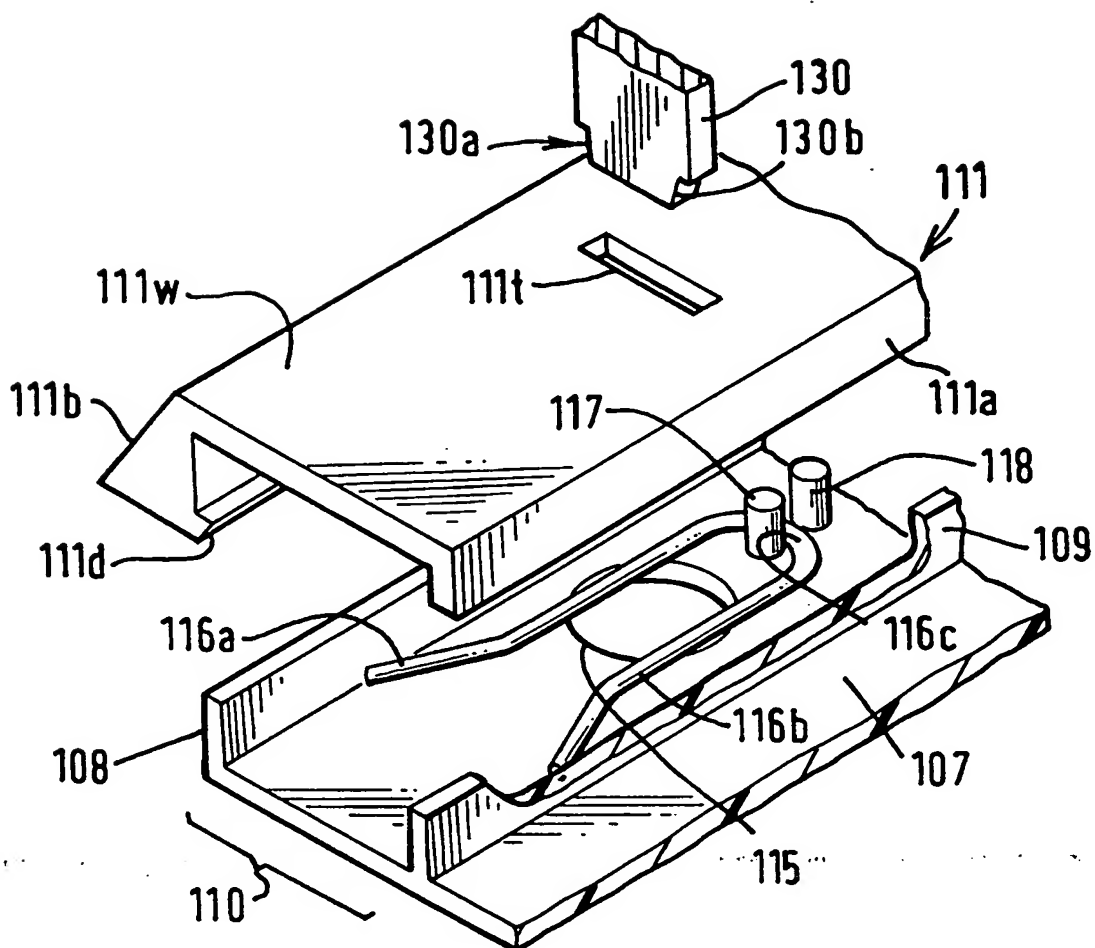


FIG. 12

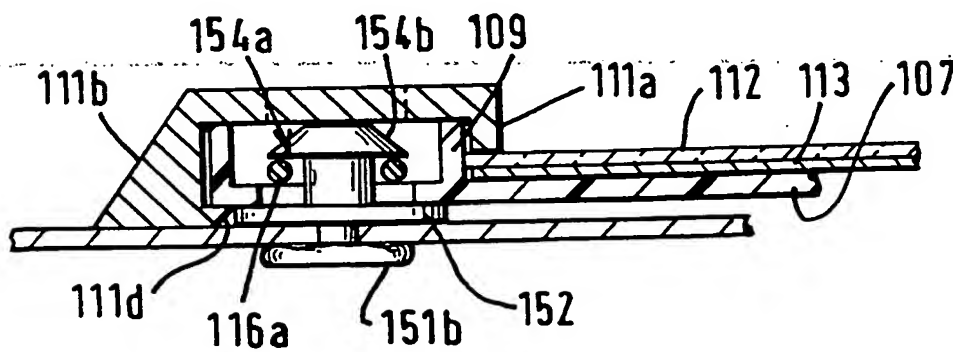
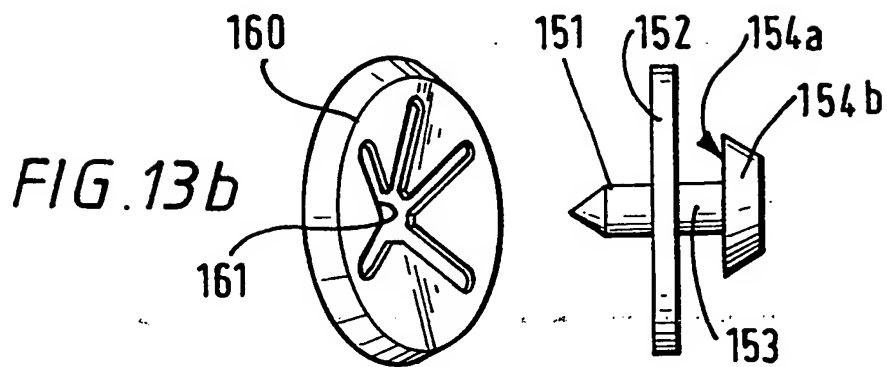
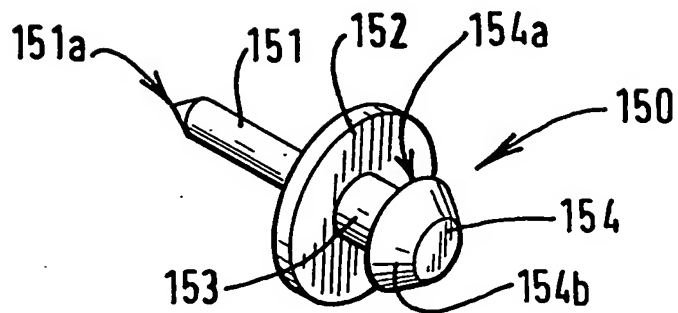
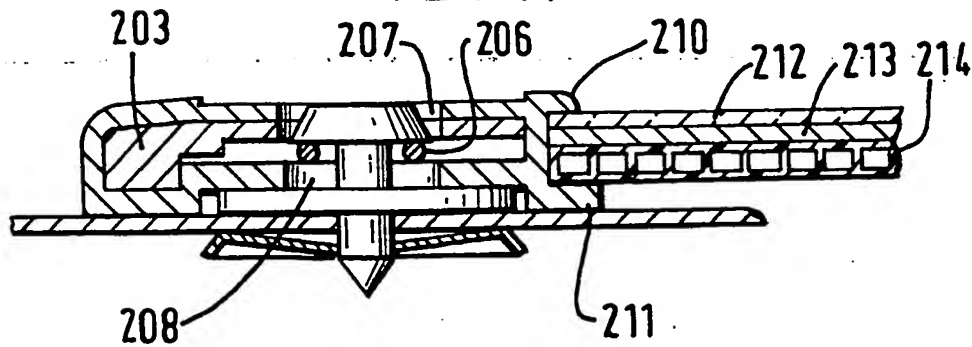


FIG. 14

*FIG. 13a**FIG. 17*



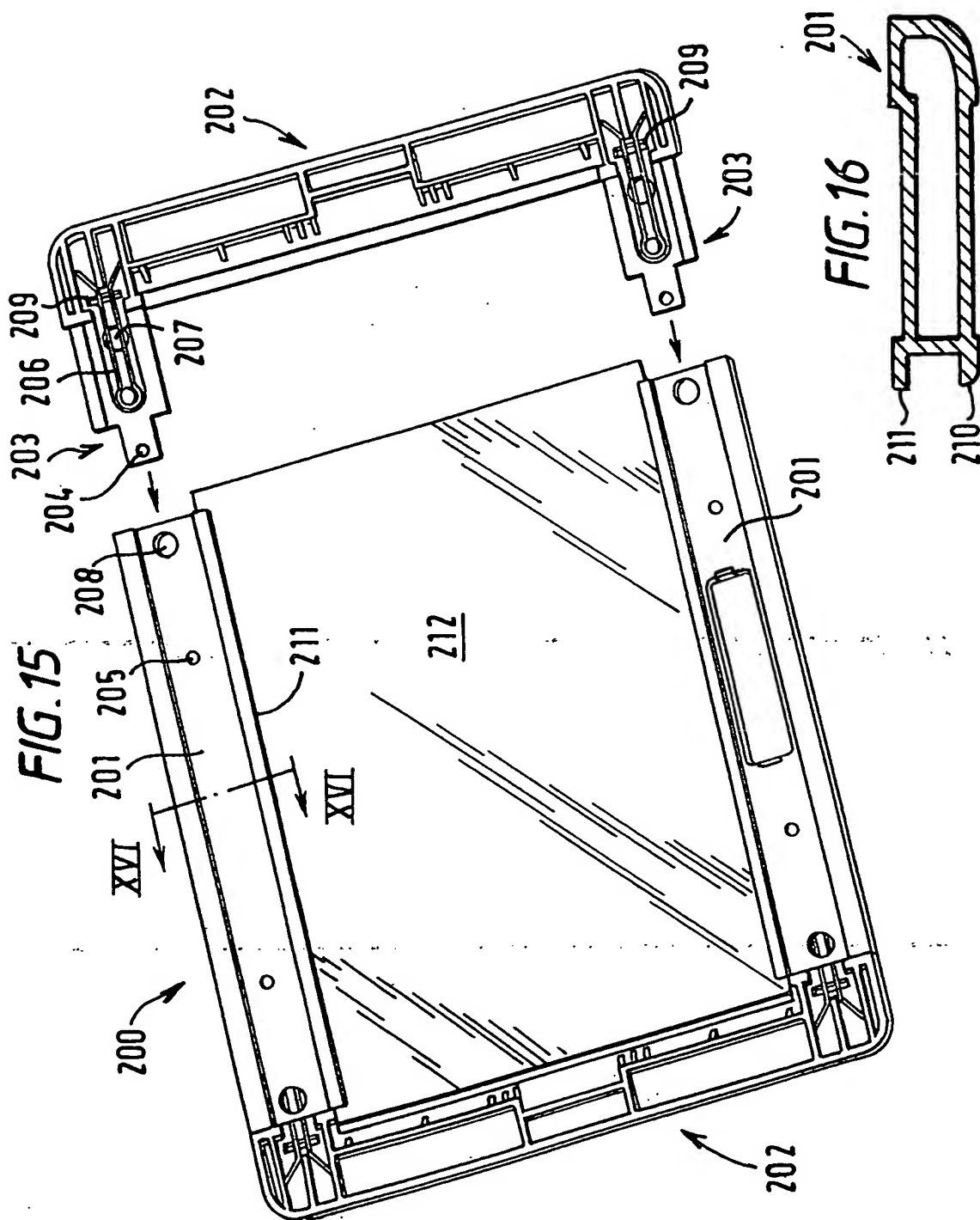
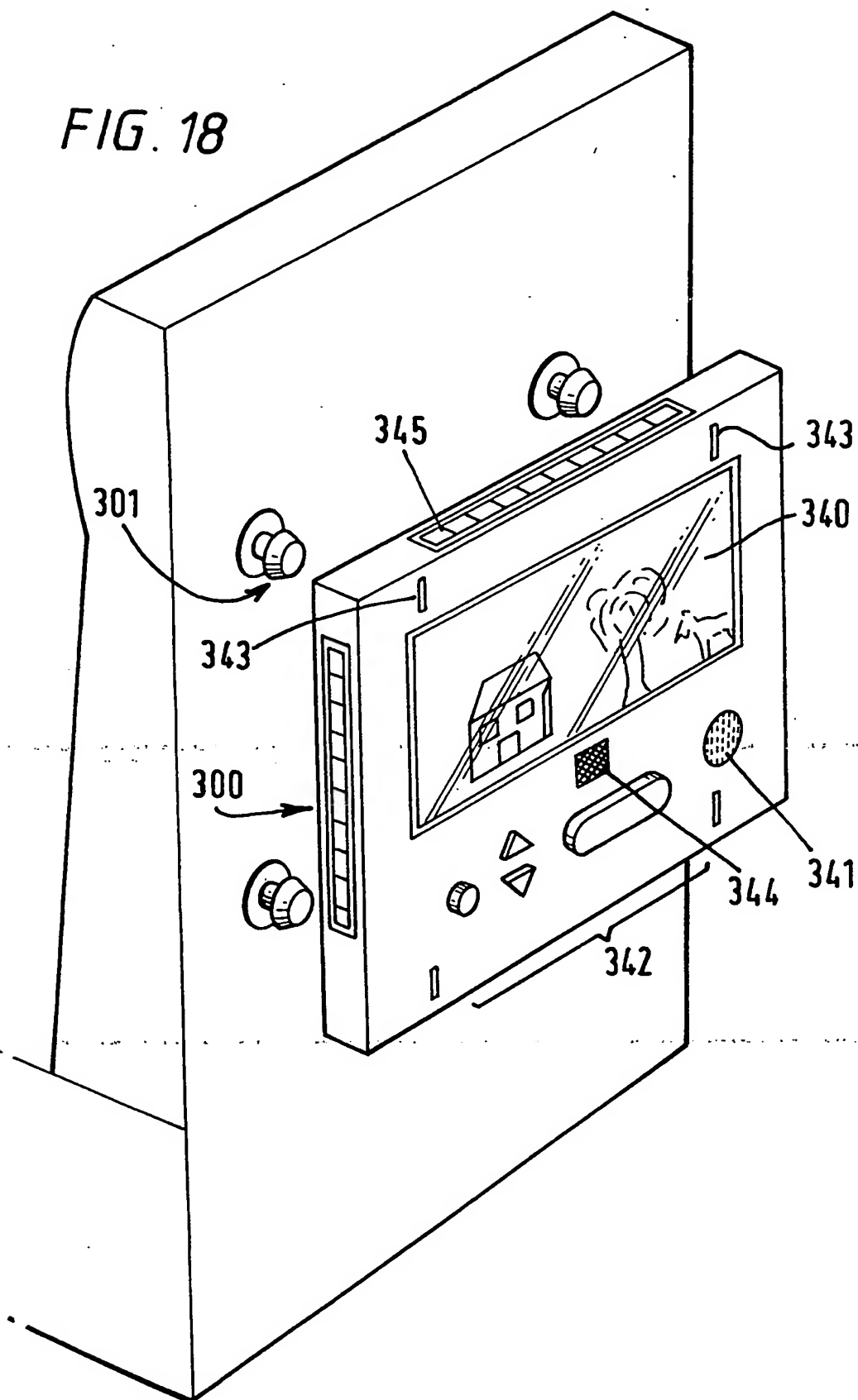
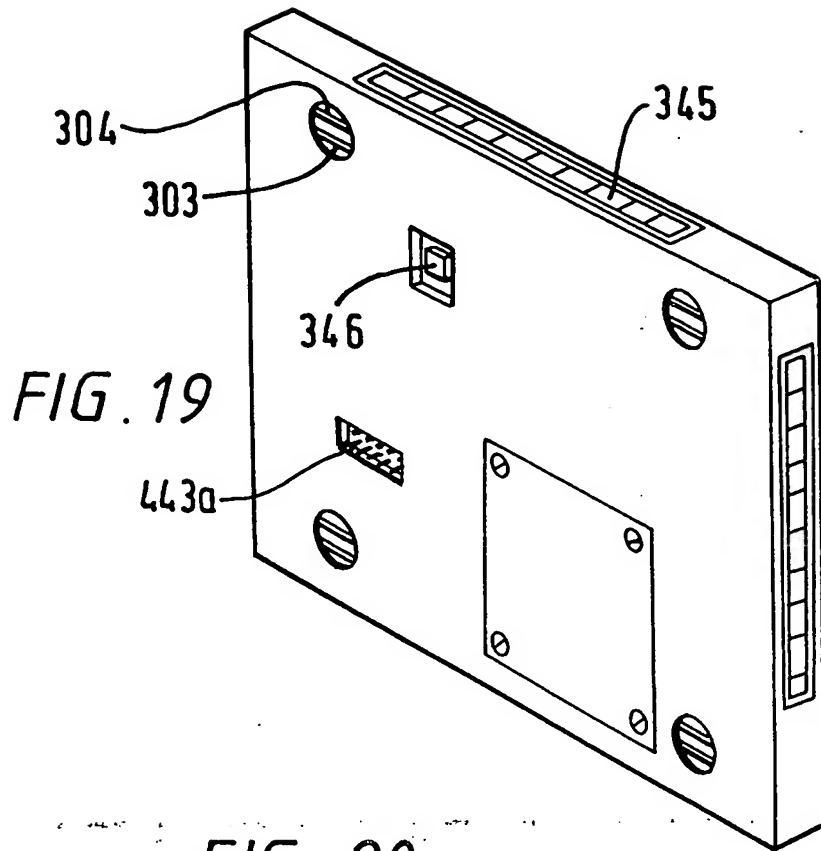


FIG. 18





*FIG. 20*

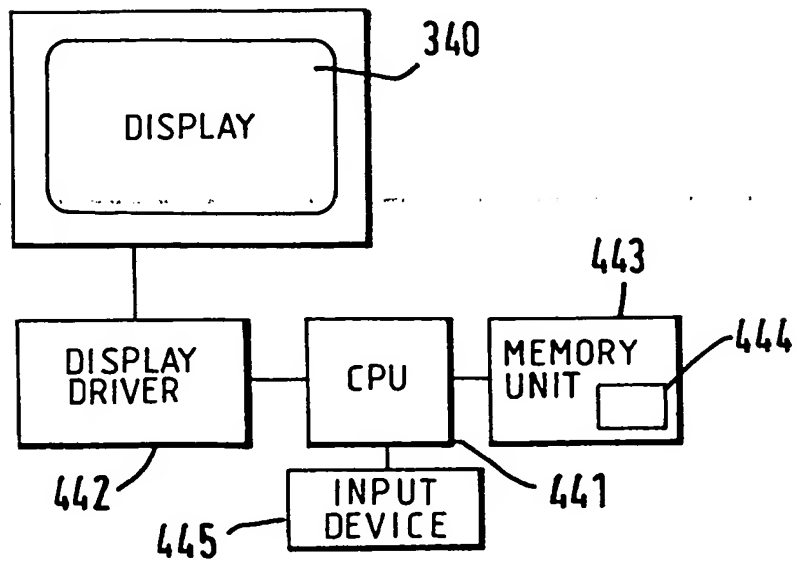


FIG. 21

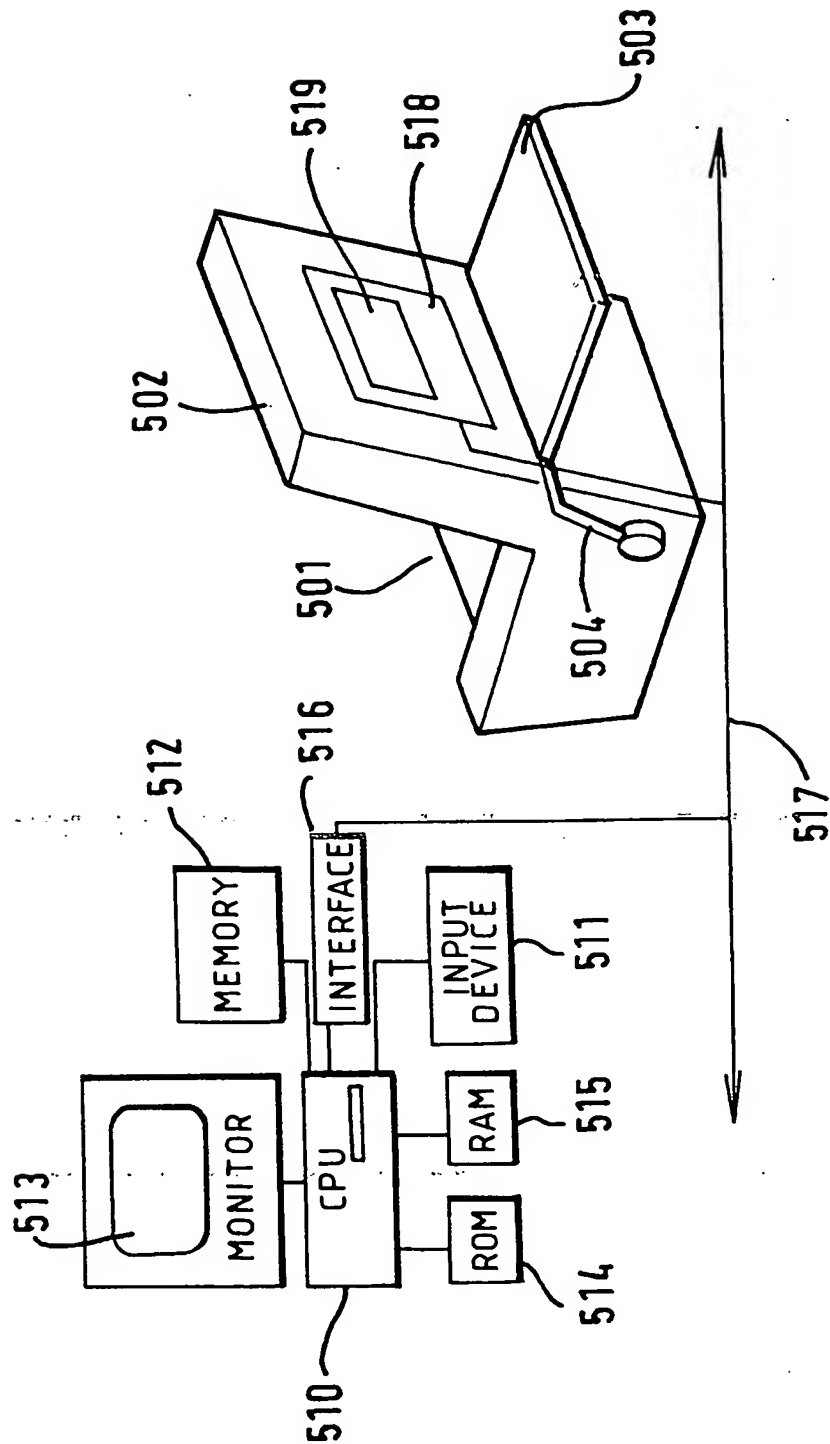
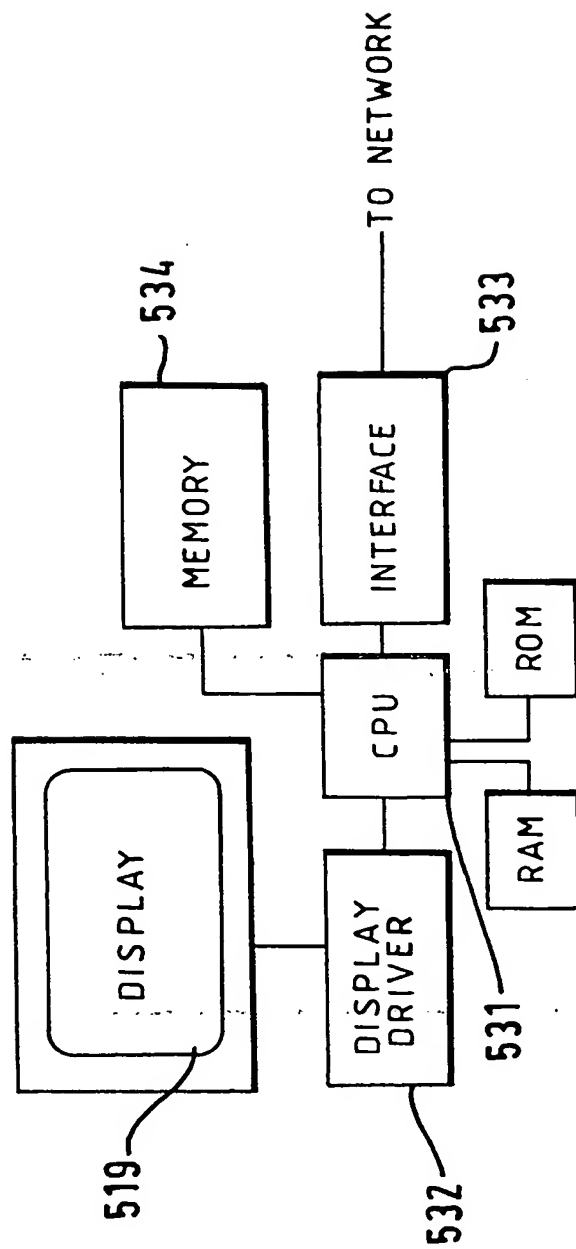


FIG. 22



# INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 98/02053

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 6 G09F21/04 B64D11/00 G09F23/00

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 G09F B64D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	FR 2 677 791 A (G.BELAIR) 18 December 1992	1-5, 7, 21-24, 27
Y	see the whole document	8, 10-20, 25, 28-33, 35-43, 46, 47, 51-63
Y	US 4 630 821 A (L. GREENWALD) 23 December 1986	8, 10-20, 25, 28-33, 35-43, 46, 47, 51-63
	see abstract; claims; figures	
	-/--	



Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

### \* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

29 September 1998

Date of mailing of the international search report

07/10/1998

Name and mailing address of the ISA

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## INTERNATIONAL SEARCH REPORT

Inter. Appl. No.

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